## Laws of Exponents

$a$ = constant (# we know)  $m$ & $n$ = variables

- $a^m \cdot a^n = a^{m+n}$

$2^3 \cdot 2^4 = 2^7$

$2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$

- $(a^m)^n = a^{m \cdot n}$

$(2^3)^2 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = 2^6$

- $\frac{a^m}{a^n} = a^{m-n}$

$\frac{2^4}{2^3} = \frac{2 \cdot 2 \cdot 2 \cdot 2}{2 \cdot 2 \cdot 2} = 2^1 = 2$

- $a^{-n} = \frac{1}{a^n}$

$\frac{2^3}{2^5} = 2^{3-5} = 2^{-2} = \frac{1}{4}$

$\frac{2 \cdot 2 \cdot 2}{2 \cdot 2 \cdot 2 \cdot 2 \cdot 2} = \frac{1}{2 \cdot 2} = 2^{-2} = \frac{1}{4}$

- $a^0 = 1$

$2^3 = 8$
$2^2 = 4$
$2^1 = 2$
$2^0 = 1$

$2^{-1} = \frac{1}{2}$
$2^{-2} = \frac{1}{4}$

- $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$

$\left(\frac{3}{4}\right)^2 = \frac{3}{4} \cdot \frac{3}{4} = \frac{3^2}{4^2}$

- $(ab)^n = a^n b^n$

$(3 \cdot 4)^3 = 3 \cdot 4 \cdot 3 \cdot 4 \cdot 3 \cdot 4 = 3^3 \cdot 4^3$

- $\left(\frac{a}{b}\right)^{-n} = \left(\frac{b}{a}\right)^n$

$\left(\frac{a}{b}\right)^{-n} = \frac{a^{-n}}{b^{-n}} = \frac{\frac{1}{a^n}}{\frac{1}{b^n}} = \frac{1}{a^n} \cdot \frac{b^n}{1} = \frac{b^n}{a^n}$

$$\frac{2^3 \cdot 2^4}{(2^4)^2} = \frac{2^7}{2^8} = 2^{-1} = \boxed{\frac{1}{2}}$$

p. 368 $\approx$ 15 min

#1–10, 24

① $12a^8$ ② $8$ ③ $16x^6y^{10}$ ④ $\frac{8y^{12}}{x^{15}}$

⑤ $4a^3$ ⑥ $2x^8y^5$ ⑦ $\frac{1}{2xy^5}$ ⑧ $\frac{9x^4}{4}$

⑨ $-18m^3n^3$ ⑩ $\frac{1}{27x^{12}y^{15}}$ ㉔ $s^3t^2r^2$

③ $(4x^3y^5)^2 = 16x^6y^{10}$

④ $(2x^{-5}y^4)^3 = 8x^{-15}y^{12} = \frac{8y^{12}}{x^{15}}$

⑤ $\frac{8a^5}{2a^2} = 4a^3$

⑥ $\frac{6x^7y^5}{3x^{-1}} = 2x^8y^5$

⑦ $\frac{(4x^2)^0}{2xy^5} = \frac{1}{2xy^5}$

⑧ $\left(\frac{3x^2}{2}\right)^2 = \frac{9x^4}{4}$

⑨ $(-6m^2n^2)(3mn) = -18m^3n^3$

⑩ $(3x^4y^5)^{-3} = \frac{1}{27x^{12}y^{15}}$

24 $\frac{s^2t^3}{r} \cdot \frac{sr^2}{t} = \frac{s^3t^3r^2}{rt} = s^3t^2r$

$\sqrt{4}$ → what times itself = 4, Ans = 2

$\sqrt[3]{27}$ → what times itself 3 times = 27, Ans 3

$\sqrt[4]{216}$ – what times itself 4 times = 216, Ans

$\sqrt[5]{\phantom{x}}$ – what times itself 5 times

$\sqrt{-100} = 10i$

$\sqrt[3]{-1000} = -10$

$-10 \cdot -10 = 100 \cdot -10 = -1000$

$-10 \cdot -10 \cdot -10 = -1000$

$\sqrt[4]{-16} = 2i$

$\sqrt[5]{-32} = -2$

$\sqrt{8} \cdot \sqrt{2} = \sqrt{16} = 4$

$\sqrt{50} \cdot \sqrt{2} = \sqrt{100} = 10$

$\sqrt{2} \cdot \sqrt{4} = \sqrt{8} \approx 2.82$

$\sqrt[2]{x^4} = x^2$

$\sqrt[2]{x^6} = x^3$

$\sqrt[3]{x^6} = x^2$

Sect. 7.1, p. 372

#1-8, 13-15, 17, 18, 21-24, 36, 62-69

- Turn in review ch. 5

  p. 299 or p. 300

$$\sqrt{\frac{64}{169}} = \frac{\sqrt{64}}{\sqrt{169}} = \boxed{\frac{8}{13}}$$